
January 1997
SFR-049

# Low Emission Vehicles and Alternative Fuels Use Status Report

Office of Air Quality

printed on
recycled paper

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION






Published and distributed
by the
Texas Natural Resource Conservation Commission
Post Office Box 13087
Austin, Texas 78711-3087

# Table of Contents


1. EXECUTIVE SUMMARY . . . . . 1

2. INTRODUCTION . . . . . 2

3. DISCUSSION . . . . . 3
- 3.1. How has SB 200 altered the Texas Alternative Fuel Fleet (TAFF) program? . . . . . 3
- 3.2. Emission standards. . . . . 4
- 3.3. Alternatively fueled vehicle studies . . . . . 7
  - *1. Quantifying the Emission Reductions Due to the Texas Alternative Fuel Fleet Program, Engines Fuels & Emissions Engineering (EF&EE), February 1995.* . . . . . 7
  - *2. Alternatively Fueled Vehicle Emissions Study, The Alternative Fuels Laboratory, June 1995.* . . . . . 7
- 3.4. Availability of LEVs . . . . . 8
- 3.5. The National Low Emission Vehicle Program . . . . . 9
- 3.6. The Texas Clean Fleet (TCF) Program Implementation . . . . . 10

4. STATUS OF AFFECTED FLEETS . . . . . 12
- 4.1. School District Fleets . . . . . 12
- 4.2. State Fleets . . . . . 12
- 4.3. Transit Authority Fleets . . . . . 13
  - *1. Transit Authorities in Non-Attainment Areas Subject to the TNRCC's Rules* . . . . . 15
    - a. Dallas Area Rapid Transit (DART) . . . . . 15
    - b. El Paso, Sun Metro . . . . . 15
    - c. Fort Worth Transit Authority, (The T) . . . . . 15
    - d. Metropolitan Transit Authority of Harris County (Houston Metro) . . . . . 15
  - *2. Transit Authorities Not Impacted by the TNRCC's Rules* . . . . . 16
    - a. Corpus Christi Regional Transit . . . . . 16
    - b. Laredo Municipal Transit System, (El Metro) . . . . . 16
    - c. Via Metropolitan Transit - San Antonio . . . . . 16
  - *3. Certain Transit Authorities - Capital Metropolitan Transportation Authority, Austin (Capital Metro)* . . . . . 17
- 4.4. Private Fleet Coverage . . . . . 17

5. STATE AND TRANSIT AUTHORITY FLEET DETERMINATIONS . . . . . 19
- 5.1. Evaluation/Determination Regarding Transit Authority and State Fleets . . . . . 19
  - *1. Transit Authority Fleets* . . . . . 19
    - a. Non-attainment Area Transit Authority Fleets under the Health and Safety Code . . . . . 19
    - b. Statewide Transit Authority Fleets under the Texas Transportation Code . . . . . 20
  - *2. State Fleets* . . . . . 21
    - a. State Fleets Under the State Purchasing Code . . . . . 21

APPENDIX I - History

APPENDIX II - State Fleet Data

# List of Tables

Table 1. Light-Duty Vehicle Exhaust Emission Standards . . . . . 5
Table 2. Heavy-Duty Vehicle Exhaust Emission Standards . . . . . 6
Table 3. Number of Public Refueling Sites . . . . . 13
Table 4. Fleet Data Survey For Texas Transit Authorities . . . . . 14
Table 5. Determination Criteria . . . . . 19

# Glossary of Acronyms

| | |
|---|---|
| **CAAA** | Federal Clean Air Act Amendments of 1990 |
| **CNG** | Compressed natural gas |
| **CO** | Carbon monoxide |
| **E85** | Ethanol blend of 85% ethanol and 15% gasoline |
| **FCFF** | Federal Clean Fuel Fleet program |
| **GSC** | General Services Commission |
| **GVWR** | Gross vehicle weight rating |
| **HC** | Hydrocarbons |
| **HCHO** | Formaldehyde |
| **HDV** | Heavy-duty vehicle |
| **HSC** | Texas Health and Safety Code |
| **ILEV** | Inherently low emission vehicle |
| **LDT** | Light-duty truck |
| **LDV** | Light-duty vehicle |
| **LEV** | Low emission vehicle |
| **LNG** | Liquefied natural gas |
| **LPG** | Liquefied Petroleum gas, commonly referred to as "propane" |
| **M85** | Methanol blend of 85% methanol and 15% gasoline |
| **MERC** | Mobile emission reduction credit |
| **MY** | Model year |
| **NAA** | Non-attainment area |
| **NLEV** | National Low Emission Vehicle program |
| **NMHC** | Non-methane Hydrocarbons |
| **NMOG** | Non-methane organic gas |
| **NOx** | Oxides of Nitrogen |
| **OBD** | On-board diagnostics |
| **OEM** | Original equipment manufacturer |

| | |
|---|---|
| **OTR** | Ozone Transport Region |
| **PCC** | Program compliance credit |
| **PM10** | Particulate matter, smaller than 10 microns |
| **RFG** | Reformulated gasoline |
| **SB 200** | Senate Bill 200, Acts of the 74th Texas Legislature, 1995 |
| **SIP** | State implementation plan |
| **SPC** | State Purchasing Code |
| **TACB** | Texas Air Control Board |
| **TAFF** | Texas Alternative Fuel Fleet program |
| **TCF** | Texas Clean Fleet program |
| **Tier 1** | Current federal emission standard for light-duty vehicles |
| **TLEV** | Transitional low emission vehicle |
| **TNRCC** | Texas Natural Resource Conservation Commission |
| **TTC** | Texas Transportation Code |
| **ULEV** | Ultra-low emission vehicle |
| **VOC** | Volatile organic compound |
| **ZEV** | Zero emission vehicle |

# 1. EXECUTIVE SUMMARY

The Texas Natural Resource Conservation Commission (TNRCC) is required by Section 382.141 of the Texas Health and Safety Code (HSC) to report biennially on its evaluations and determinations on the use of alternative fuels and low emission vehicles (LEVs) in Texas. This report has been submitted to the governor and the 75th Texas Legislature, and is available to the public as TNRCC publication number SFR-49.

The TNRCC is currently in the process of implementing Senate Bill 200 (SB 200), Acts of the 74th Texas Legislature, 1995. Rules to support the implementation are being developed in two phases. Phase I of the TNRCC's rules, adopted July 24, 1996, covers LEV use requirements for transit authorities in the four non-attainment areas and LEV use for private and local government fleets in serious and above non-attainment areas (Houston/Galveston, and El Paso). Phase II of the TNRCC's rules, scheduled for development in late spring 1997, will complete the SB 200 rule-making by extending the LEV use requirements to private and local government fleets in the remaining non-attainment areas (Dallas/Fort Worth and Beaumont/Port Arthur) in accordance with Section 382.132 of the HSC.

By the date of this report only transit authority fleets established under Chapters 451, 452, or 453 of the Texas Transportation Code (TTC) and state vehicle fleets have faced LEV or specified fuel use requirements under SB 200. Transit authority fleets were required to have 50% of their total fleet certified to the federal LEV standards. State vehicle fleets were required to have 50% of their total fleet capable of operating on one of five specified fuels (electricity, ethanol, liquefied petroleum gas (propane), methanol, or natural gas). No transit authority fleets were able to achieve the percentage requirement due to a lack of certified LEVs in configurations necessary for transit bus applications. In addition, data provided by the General Services Commission (GSC) indicated that five of the 92 affected state agency fleets met or exceeded the September 1, 1996 50 percent requirement. Waivers from the program granted by the GSC on the basis of cost or lack of fuel or equipment enabled an additional 18 of the 92 affected state agency fleets to be in compliance with the requirement at the date of this report.

The HSC required the TNRCC to make three determinations by December 31, 1996: (1) under the HSC, on the emission reduction effectiveness of the LEV program in the non-attainment areas for transit authorities established under Chapters 451, 452, or 453 of the TTC; (2) under the TTC, on the emission reduction effectiveness of the LEV program in all areas for transit authorities established under Chapters 451, 452, or 453 of the TTC; and (3) under the State Purchasing Code (SPC), on the emission reduction effectiveness of the specified fuel use program for state vehicle fleets.

The TNRCC determined in the fall of 1996 to leave the LEV requirement for all transit authority fleets in 1998 at 50 percent. In addition, the TNRCC determined to leave the specified fuel use requirement for state vehicle fleets in 1998 at 50 percent.

# 2. INTRODUCTION

The Texas Natural Resource Conservation Commission (TNRCC) is required by the Texas Health and Safety Code, Section 382.141, to report biennially to the legislature the TNRCC's evaluations and determinations on the use of alternative fuels and low emission vehicles (LEVs). The 74th Legislature, 1995, legislated a number of changes to the existing alternative fuels program in Texas through the enactment of Senate Bill 200 and Senate Bill 1.

The TNRCC is statutorily required to adopt rules to implement the Health and Safety Code as amended by SB 200. The TNRCC has chosen to adopt these rules in phases. Phase I of the Texas Clean Fleet (TCF) program was adopted on July 24, 1996, covering LEV requirements for transit authorities in the four non-attainment areas and for private and local government fleets in serious and above non-attainment areas. Phase II of the TNRCC's rules, scheduled for development in late spring 1997, will complete the SB 200 rule-making by extending the LEV requirements to private and local government fleets in the remaining non-attainment areas. The current status of the four Texas non-attainment areas is listed below:

- Houston/Galveston - Severe for ozone
- El Paso - Serious for ozone, Moderate for carbon monoxide (CO), and Moderate for particulate matter (PM10)
- Beaumont/Port Arthur - Moderate for ozone
- Dallas/Fort Worth - Moderate for ozone.

Senate Bill 1, Acts of the 74th Texas Legislature, 1995 removed any alternative fuel requirements from school district fleets. Therefore, the TNRCC did not impose any alternative fuel or LEV requirements on school districts.

A detailed history of state legislation and rules affecting the use of alternative fuels and low emission vehicles in Texas is attached in Appendix I.

The Federal Clean Air Act Amendments (CAAA), 1990 require that states implement the Federal Clean Fuel Fleet (FCFF) program in serious and above ozone non-attainment areas. States do, however, have the option to submit a substitute program in place of FCFF, as long as that substitute achieves equivalent emission reductions to the FCFF program. In 1994, Texas submitted a revised State Implementation Plan (SIP) to the U.S. Environmental Protection Agency (EPA), substituting the Texas Alternative Fuel Fleet (TAFF) program for the FCFF program.

Subsequent to the adoption by the TNRCC of phase I of the TCF rules in July 1996 to implement the requirements of SB 200, the TNRCC has submitted a further SIP revision to EPA, replacing the TAFF program with particular aspects of the TCF program, i.e. the LEV requirements for private and local government fleets in the serious and above non-attainment areas.

# 3. DISCUSSION

## 3.1. How has SB 200 altered the Texas Alternative Fuel Fleet (TAFF) program?

The TAFF program was originally submitted as Texas' opt-out of the FCFF program. This program was developed using the original 1989 senate bills (SB 740 and SB 769) as a guide. Although there was no requirement in the senate bills for fleets to meet an emission standard, it was necessary for the LEV standards to be adopted in the TAFF program to ensure emissions equivalency with the federal program. The originally covered fleets (transit authority fleets, state fleets, and school district fleets) were required by TAFF to meet the LEV standards using one of the five approved alternative fuels (electricity, ethanol, liquefied petroleum gas, methanol, and natural gas). In addition, TAFF covered private and local government fleets under the LEV requirement in order to ensure equivalency with the federal program. However, the private and local government fleets could use any fuel (including reformulated gasoline and diesel) which enabled the vehicle to be certified to the LEV standards.

SB 200 amended the sections of the Texas Health and Safety Code which guided the TNRCC in crafting the TAFF opt-out program. The TNRCC then modified the opt-out program (TAFF) to match SB 200. The main areas of difference are set out below:

Alternative fuels: SB 200 redefined alternative fuels from meaning substitutes or replacements for conventional fuels to mean any fuel or power source that when used in a clean-fuel vehicle allows the vehicle to comply with the federal LEV standards. Because the focus is now on what comes out of the tailpipe rather than what goes in, there is no longer any specific fuel use requirement for fleets (except the state fleets, which remain limited to using the five specified fuels from the original legislation).

Clean Fuel Vehicles: SB 200 created this new definition but, in essence, SB 200 and the TAFF program are virtually identical in the basic requirement of the respective programs. Clean Fuel Vehicles are defined under SB 200 as vehicles in classes or categories of classes that have been certified to meet, for any model year, the federal low emission vehicle standards established for the Federal Clean Fuel Fleet Program.

Fleet Vehicle: Both TAFF and SB 200 include vehicles that are centrally fueled, capable of being centrally fueled, or fueled at facilities serving both business customers and the general public. However SB 200 exempted vehicles garaged at home at night. The TAFF program exempted all vehicles over 26,000 lbs. gross vehicle weight rating (GVWR) from the LEV requirements, but SB 200 included vehicles over 26,000 lbs. GVWR used specifically by transit authorities.

Covered Areas: SB 200 expanded coverage of the LEV program to all of Texas' non-attainment areas as well as to transit authorities located in the following attainment areas: Austin, Corpus Christi, Laredo, and San Antonio. The TAFF program required LEV vehicles only in those areas required under the Clean Air Act Amendments to have the federal program, i.e. serious and above ozone and CO non-attainment areas (currently these include the Houston/Galveston and El Paso non-attainment areas).

Implementation Schedule: SB 200 modified the TAFF program's implementation schedule. The TAFF program allowed fleets the option of meeting either a 100 percent new purchase LEV requirement or achieving 30 percent, 50 percent, and 90 percent of their fleet at the LEV standards by September 1 of 1998, 2000, and 2002, respectively. SB 200 allows the option of meeting a percent of new purchase or a percent of total fleet requirement in the first year, then for all subsequent years fleets are required to meet both a percent of new purchase requirement and a percent of total fleet requirement. The SB 200

implementation schedule is as follows:

30 percent of new purchases after 9-1-98 **or** 10 percent of total fleet on 9-1-98
50 percent of new purchases after 9-1-00 **and** 20 percent of total fleet on 9-1-00
90 percent of new purchases after 9-1-02 **and** 45 percent of total fleet on 9-1-02

Exceptions: Under TAFF, exceptions to the implementation schedule were available only to transit authorities as provided in the original Senate Bills 740 and 769. SB 200 extended these exceptions to all affected fleets and added an additional cost exception for all fleets.

Credit programs: As under the TAFF program, SB 200 provides for Mobile Emission Reduction Credits (MERCs) for trading between fleets and trading between fleets and stationary sources. In addition, SB 200 made provisions for the acquisition of MERCs through binding contracts to purchase LEVs. SB 200 created another type of credit, program compliance credits (PCCs). PCCs are only tradeable between fleets affected by the program.

Affected fleets: The TAFF program covered all private, local government, federal, state, school district, and transit authority fleets of 15 or more vehicles operated within the state's serious and above non-attainment areas. SB 200 modified these requirements to cover private fleets of more than 25 fleet vehicles and local government fleets of more than 15 vehicles. In addition, SB 200 removed the LEV requirements from state fleets and removed federal fleets completely from the program.

## 3.2. Emission standards.

Table 1 and Table 2 below show the Light-Duty Vehicle Emission Standards and Heavy-Duty Vehicle Emission Standards which are the basis of the clean fuel fleet vehicle programs.

**Table 1. Light-Duty Vehicle Exhaust Emission Standards**

**Light-Duty (<8,500 lbs. GVWR) Vehicle Exhaust Emission Standards[a] in grams per mile:**

| Category | NMOG[b] | CO | NOx | PM[c] | HCHO[d] | Evap[e] |
|---|---|---|---|---|---|---|
| **Tier 0** | 0.34[f] | 3.4 | 1.0 | 0.20 | - | 2 |
| **Tier 1** | 0.25 | 3.4 | 0.4[g] | 0.08 | - | 2 |
| **TLEV** | 0.125 | 3.4 | 0.4 | 0.08 | 0.015 | 2 |
| **LEV** | 0.075 | 3.4 | 0.2 | 0.08 | 0.015 | 2 |
| **ULEV** | 0.040 | 1.7 | 0.2 | 0.08 | 0.008 | 2 |
| **ILEV** | 0.075 | 3.4 | 0.2 | 0.08 | 0.008 | 5[h] |
| **ZEV** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

a. These light-duty standards are only for the lightest weight class of light-duty vehicles. There are four other classes of light-duty vehicles with different LEV standards.
b. Non-methane organic gas
c. Diesel-powered vehicles only.
d. Formaldehyde.
e. Grams per test.
f. Reported as non-methane hydrocarbons (NMHC)
g. Diesel-powered vehicles =1.0 grams / mile
h. Tested with evaporative control system disabled.

**Table 2. Heavy-Duty Vehicle Exhaust Emission Standards**

**Heavy-duty Vehicle (>8,500 lbs. GVWR) Exhaust Emission Standards in grams per brake horsepower-hour:**

| Category | HC | NMHC+NOx | CO | NOx | PM | HCHO | Evap |
|---|---|---|---|---|---|---|---|
| **MY 1993** | 1.3 | - | 15.5 | 5.0 | 0.25 | - | 3[a] |
| **MY 1994-7** | 1.3 | - | 15.5 | 5.0 | 0.10[b] | - | 3[a] |
| **MY 1998-9** | 1.3 | - | 15.5 | 4.0 | 0.10[b] | - | 3[a] |
| **LEV** | - | 3.8 | 15.5 | - | 0.10 | - | 3[a] |
| **ULEV** | - | 2.5 | 7.2 | - | 0.05 | 0.025 | 3[a] |
| **ILEV** | - | 2.5 | 14.4 | - | 0.10 | 0.05 | 2 |
| **ZEV** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2004[c]** | - | 2.5 | 15.5 | - | 0.05 | - | 3[a] |

a. Vehicles with GVWR >14,000 lbs. = 4 grams per test.
b. Urban buses = 0.07 g/bh-hr.
c. Draft proposed rules

There are several ways to measure hydrocarbons from vehicles: total hydrocarbons (THC); non-methane hydrocarbons (NMHC), which removes methane from the mass of emissions; volatile organic compounds (VOCs), which is the measurement used for most state implementation plan calculations; and non-methane organic gas (NMOG), which includes all organic gases except methane. For the purposes of this discussion NMHC, NMOG, and VOCs are treated as equivalent.

Prior to the passage of the Clean Air Act Amendments (CAAA) of 1990, the cleanest conventional light-duty[1] standard was the Tier 0 standards. The CAAA established the next cleanest standard for light-duty vehicles and trucks to meet the Tier I standards. The Tier I standards started phasing in during model year (MY) 1994 for light-duty vehicles and trucks up to 6,000 lbs. GVWR (automobiles and small pickups), and will start with MY 1998 for light-duty trucks between 6,001 and 8,500 lbs. GVWR (in general, ½ ton pickups and vans). All new vehicles offered for sale in the United States must be certified, at a minimum, to these conventional standards.

The CAAA also established the clean fuel fleet vehicle emission standards, the LEV standards. The LEV standards were originally adopted by the state of California in September 1990 prior to signing of the CAAA in November 1990. The CAAA adopted these California LEV standards for the Federal Clean

[1]light-duty vehicle means passenger automobiles and light-duty trucks weighing up to 8,500 lbs. GVWR.

Fuel Fleet program. Transitional low emission vehicle standards (TLEV) are standards that are helping manufacturers transition between Tier I and LEV in California.

Heavy-duty standards, particularly heavy-duty diesel standards shown in Table II for MYs 93-97, have been targeted at reducing particulate and NOx emissions. Urban bus particulate standards are more stringent than particulate standards for other types of heavy-duty vehicles. Heavy-duty standards are measured in grams per brake horsepower hour not grams per mile as in the light-duty standards. There is no direct relationship between these two units, therefore comparisons between light- and heavy-duty vehicle standards are not valid. The LEV standards for heavy-duty vehicles are more stringent for the two major ozone-producing emissions, hydrocarbons and NOx, than conventional heavy-duty standards but are the same as conventional heavy-duty vehicles for CO and particulate matter. In MY 2004, the conventional heavy-duty standards are proposed (Federal Register, Volume 61, Number 125, June 27, 1996) by the EPA to become more stringent than the LEV standards for hydrocarbons, NOx, and particulate matter.

## 3.3. Alternatively fueled vehicle studies

Two contract studies completed for the TNRCC in 1995 have provided useful data and tools for estimating emission reductions from Texas programs.

*1. Quantifying the Emission Reductions Due to the Texas Alternative Fuel Fleet Program, Engines Fuels & Emissions Engineering (EF&EE), February 1995.*

EF&EE's study provided the TNRCC with a spreadsheet which allowed more accurate modeling of emissions from the Texas fleet programs than could have been achieved by using EPA's Mobile 5a model alone. Mobile 5a is EPA's model approved for states to use in estimating emissions from on-road mobile sources. The EF&EE spreadsheet allowed modeling of emissions from all classes of vehicles and has the capability of modeling differences between the conventional and alternative fuels.

*2. Alternatively Fueled Vehicle Emissions Study, The Alternative Fuels Laboratory, June 1995.*

This study has been particularly useful to the TNRCC because the research covered converted vehicles and original equipment manufacturer (OEM) vehicles and compared the emissions performance of alternatively fueled vehicles and gasoline-fueled vehicles. Data collected from this study was used, along with data from other studies (see Section 5), to estimate the emission reductions from state vehicle fleets for use in the TNRCC's determinations regarding alternative fuel use by these fleets. A discussion of the TNRCC's determination can be found in Section 5 of this report.

This study provided emissions data for a variety of converted and OEM alternatively fueled vehicles, some of which were in use by the Texas Department of Transportation's fleet. In order to maximize the benefits of using alternative fuels, this study recommended the following:

- Operate dual-fueled CNG and LPG vehicles exclusively on the alternative fuel to maximize the emission benefits.
- Adopt a policy promoting the purchase of original equipment manufactured (OEM) alternatively fueled vehicles by state agencies.
- Require that vehicle conversions used toward compliance with the program obtain EPA

certification (either to LEV for emission reductions, or to Tier I to ensure no increase in emissions). The study found that although converted vehicles may have the potential to meet the LEV standard, not all conversions to alternative fuels result in reduced emissions. In certain instances, emission testing of converted vehicles indicated an increase in emissions of one or more pollutants.

This study found that vehicles operating on CNG and LPG were the most likely options for complying with the requirements of the TAFF program. However, the study was also very optimistic regarding the ability of ethanol- and methanol-powered vehicles to achieve the LEV standards.

## 3.4. Availability of LEVs

There is no mandate in the CAAA for vehicle manufacturers to offer LEV-certified vehicles for sale outside California. The only light-duty vehicle available in Texas for the 1997 model year that is certified to meet or exceed the low emission vehicle standard is the Ford Crown Victoria CNG vehicle, certified to the inherently low emission vehicle (ILEV) standards. This vehicle currently costs $3,255 more than a similar gasoline-powered Crown Victoria. Detroit Diesel has a medium heavy-duty engine available that is certified to the LEV standard using CNG, which currently costs $3,245 more than a similar diesel engine (this price does not include the additional costs of CNG tanks, lines, fittings, and other necessary equipment for operation on CNG). Chrysler offered CNG versions of the Dodge Ram Van and Wagon and the Dodge Grand Caravan that were certified to the ILEV on CNG in the 1996 model year, but chose not to produce these ILEVs in the 1997 model year. Chrysler has not yet decided if these vehicles will be offered in 1998.

While the vehicles currently certified at the LEV or cleaner emission standards operate on natural gas, it is likely that vehicles operating on other fuels may be certified to the LEV standards in the future. Ford's flexible-fueled Taurus runs on gasoline or gasoline/ethanol blends up to 85% ethanol (E85), or gasoline or gasoline/methanol blends up to 85% methanol (M85), and costs $345 **less** than the gasoline version but currently is certified only to the TLEV standards. Ford also offers natural gas options on its F-series pickups but not certified to the LEV standard. Ford, Chrysler, and GM all have plans for electric vehicles, which could then be certified to the zero emission vehicle (ZEV) standards.

There are vehicles available in California which are certified to the LEV standards but operate on California reformulated gasoline (RFG). Although these vehicles are not allowed to be offered for sale in Texas, they may provide an indication of vehicles with the potential of meeting the LEV standards outside California in the future. These vehicles have been specifically manufactured for use in California using California fuels to meet the requirements of the California LEV program. The California LEV program requires the sale of vehicles which meet a fleet average emission standard. This means the average of all sales in California of a manufacturer's vehicles must add up to a set average value. This value steadily decreases each year. A manufacturer can choose what types of vehicles to produce (e.g. Tier I, LEV, ULEV, etc.) to meet the fleet average. In addition, California requires a certain percentage of each manufacturer's sales to be ZEV-certified vehicles. In order to be sold outside California, LEV vehicles must be certified by the EPA for sale outside California. EPA certifies and grants certificates allowing manufacturers to offer vehicles for sale in a number of ways: (1) California-only certificates (vehicles can only be offered for sale in California), (2) 49-state certificates (vehicles can be offered for sale only in states outside California), or (3) 50-state certificates (vehicles can be offered for sale in all states including California).

The following gasoline-powered LEVs are only offered for sale in California and are operated on

California RFG:

- Ford Escort and Escort Wagon
- Ford Taurus/Sable and Taurus/Sable Wagons
- General Motors Safari Cargo and Passenger Van
- General Motors Astro Cargo and Passenger Van
- Honda Civic and Civic Del Sol
- Nissan Sentra/200SX
- Suzuki Metro
- Suzuki Swift
- Toyota Camry

## 3.5. The National Low Emission Vehicle Program

EPA has proposed regulations for the National Low Emission Vehicle (NLEV) program which would harmonize federal and California motor vehicle standards and test procedures to enable manufacturers to design and test vehicles to one set of standards nationwide. The NLEV program will relieve the 13 states in the Northeastern part of the country (the Ozone Transport Region or OTR) of the regulatory obligation to adopt and implement their own state new motor vehicle emission control programs to help reduce ozone pollution in the OTR.

The OTR states submitted a petition in February 1993, requesting EPA to require all states in the OTR to adopt the California LEV program. The California LEV program mandated the sale of LEV-certified vehicles to meet an overall non-methane organic gas (NMOG) fleet emission reduction average (NMOG is essentially equivalent to VOC). The California program also mandated the sale of zero emission vehicles (ZEVs) in increasing percentages starting in MY 1998. Because of concerns about ZEV sales mandates, the NLEV program has been developed as an alternative to the adoption of the California LEV program by the OTR states. Under EPA's leadership, the OTR states, auto manufacturers, and other interested parties have worked together with EPA to develop NLEV as a program that is agreeable to all parties, achieves equivalent or better emission reductions from motor vehicles in the OTR (compared to state-by-state adoption of the California program), and reduces pollution in a cost-effective manner nationwide.

Under EPA's proposal, the NLEV program would apply to new light-duty vehicles (LDVs) and new light-duty trucks (LDTs) less than 6,000 lbs GVWR sold in the OTR states beginning in model year 1997, and would expand to apply to all new LDVs and LDTs in the nation (except California, which is continuing with a modification of its own LEV program) beginning in model year 2001.

The NLEV program will be a voluntary program that cannot be implemented unless the auto manufacturers opt into it. The program is voluntary because Section 202 (b)(1)(c) of the Federal Clean Air Act Amendments (CAAA) prevents EPA from mandating new exhaust emission standards applicable before model year 2004. Thus, EPA cannot require auto manufacturers to meet the NLEV standards until they voluntarily opt into the program. If manufacturers choose to opt into the program, the NLEV program would then require them to certify light-duty vehicles and light-duty trucks to one of the following certification categories: Tier 1, TLEV, LEV, ULEV, or ZEV. The NLEV program would require manufacturers to produce and deliver for sale a combination of vehicles that complies with an annual fleet average NMOG value. In addition, manufacturers would be required to install on-board diagnostic systems that comply with California's On-Board Diagnostics Requirement (OBD II) regulations on all NLEV vehicles.

EPA has also proposed changes to harmonize federal and California standards and test procedures. If adopted, this should reduce the regulatory burden on manufacturers by facilitating the design, certification, and production of vehicles which meet both the NLEV program and the California LEV program requirements.

EPA has determined that the NLEV program would provide at least equivalent emissions reductions in the OTR as the adoption of the California LEV program in that region, and would do so in a more efficient and cost-effective manner. The NLEV program would result in equal or greater reductions in emissions of VOCs and NOx in the OTR for two reasons: (1) NLEV would provide for the introductions of transitional low emission vehicles (TLEVs) in the OTR in MY 1997, two years earlier than would be required under the California LEV program; (2) since the NLEV program would apply nationwide (except for California) in 2001, vehicles purchased outside the OTR that move into the region would also be NLEV vehicles.

The NLEV program is also expected to achieve pollution reduction benefits beyond those associated with ozone pollution. Under the program, motor vehicles in the 49 states will also be required to meet emissions standards for particulate matter (PM) and formaldehyde (HCHO) that are more stringent than the comparable federal Tier 1 standards.

EPA has indicated that the NLEV program may be substituted for the Federal Clean Fuel Fleet (FCFF) program in states such as Texas which have opted out of the federal program. However, a contingency plan would have to be in place in case the NLEV program does not materialize. Conflicts between the OTR and the auto manufacturers over the ZEV mandates have slowed down EPA publication of the final rules. EPA is now expected to publish the final rule early in 1997.

## 3.6. The Texas Clean Fleet (TCF) Program Implementation

The TNRCC rule-making to implement the Health and Safety Code (HSC) as amended by SB 200 is being completed in a phased approach in order to first meet the state's federal requirements for serious and above ozone non-attainment areas. In July of 1996, the TNRCC completed phase I of the required rule-making which contains LEV requirements for affected transit authority fleets in all four non-attainment areas, and LEV requirements for local government and private fleets in the serious and above ozone non-attainment areas of Houston/Galveston and El Paso. The second phase of the rule-making to implement SB 200 will commence in the spring of 1997 and will complete the required rule-making by extending LEV requirements to private and local government fleets in the Dallas/Fort Worth and Beaumont/Port Arthur moderate non-attainment areas.

SB 200 contained provisions covering state agencies and transit authorities outside the non-attainment areas. Except for exception authority granted over Capital Metro in Austin, the TNRCC has no authority over state agencies or over transit authorities located outside the state's non-attainment areas. The TNRCC is, however, required to report the status of these fleets to the legislature.

The phase I rules contain only a limited number of implementation requirements required by the date of this legislative report. Specifically, only four transit authorities have thus far been required to meet an implementation mandate under the TNRCC's Texas Clean Fleet rule. Houston Metro, Dallas Area Rapid Transit (DART), Fort Worth Transit Authority (The "T"), and Sun Metro in El Paso, were required to have 50 percent of their total fleet at the LEV standards by September 1, 1996. All of these transit authorities have applied for a cost exception. These transit authorities were also required to report the status of their fleets to the TNRCC by September 30, 1996. All four transit authorities have complied with this reporting requirement.

The transit authorities which have applied for an exception from the 50 percent LEV requirement have argued that, to date, there are no EPA-certified LEV vehicles available for transit bus applications. Therefore the cost of compliance may be considered infinite. The TNRCC has granted exceptions to DART, The T, and Houston Metro. The TNRCC anticipates granting an exception to Sun Metro in El Paso pending the submission of additional information. Table 3 in Section 4.3. shows the status of each transit authority.

The TNRCC's rules also cover exceptions for Capital Metro in Austin which require the authority to apply to the executive director of the TNRCC in order to have the percentage requirements reduced or waived if Capital Metro cannot achieve the 50% LEV requirement under the Texas Transportation Code (TTC). Capital Metro is in the process of applying to the TNRCC for an exception from the TTC requirements.

The next implementation requirement under the TNRCC's phase I rules is for private and local government fleets to register with the executive director by September 1, 1997. Registration is necessary in order to help the TNRCC identify affected fleets and make them aware of the LEV requirements which start in September 1998. In order to help identify those fleets which may be subject to this regulation, the TNRCC will modify a database supplied by the Texas Department of Transportation, in combination with a private fleet database purchased in the fall of 1996. Fleets will be able to register and report the status of their fleet either on paper or electronically. The electronic reporting mechanism is currently under development and expected to be operational by early summer 1997.

# 4. STATUS OF AFFECTED FLEETS

## 4.1. School District Fleets

SB 740, Acts of the 71st Legislature 1989, required school districts with more than 50 vehicles used for transporting children to purchase alternatively fueled vehicles and maintain certain percentages of alternatively fueled vehicles in their fleets by specified milestone dates. SB 7, Acts of the 73rd Legislature 1993, delayed compliance with the alternative fuel use mandates for school district fleets until September 1, 1997. SB 1, Acts of the 74th Legislature 1995, modified The Texas Education Code, which removed all alternative fuel requirements from school district fleets. Because of the passage of SB 1, the TNRCC has imposed no alternative fuel or LEV requirements on school district fleets.

## 4.2. State Fleets

State agencies, state colleges, state schools, and state hospitals are required by SB 200 to have 50 percent of their total fleet **capable** of operation on one of the five specified fuels (electricity, ethanol, liquefied petroleum gas, methanol, or natural gas) but not certified to the LEV standards. General Services Commission (GSC) data compiled in the summer of 1996 shows that 92 state agencies have a fleet of more than 15 vehicles. These affected agencies reported a combined total of 26,073 vehicles, with 7,895 (30%) of their vehicles capable of operating on an alternative fuel. However, since SB 200 requires all vehicles purchased by state agencies with more than 15 vehicles to be capable of operating on one of the five specified fuels, variations in the total vehicle numbers due to recent purchases or conversions may have occurred since these state vehicle numbers were reported to TNRCC.

Appendix II shows the percentage of state agencies in compliance with the 50 percent requirement as calculated by GSC after taking into consideration waivers granted to individual state agencies for a portion of their fleet vehicles.

The GSC state agency data for total vehicles, but not including GSC granted waivers, reflects that five of the 92 state agencies had 50 percent or more vehicles in their fleet capable of using one of the specified fuels by September 1, 1996. Waivers granted by the General Services Commission have allowed an additional 18 state agencies to be in compliance with SB 200 specified fuel use mandates.

Because state agencies are required to purchase vehicles capable of operating on specified fuels, the availability of these fuels is a factor in the implementation of this part of the program. Table 3 shows the number of refueling sites available for public use in Texas for the fuels specified for use by state agencies. Although no information is available on the specific number of sites for electric vehicles, it should be noted that most electric vehicles can be fueled at any electrical outlet.

**Table 3. Number of Public Refueling Sites**

| Fuel Type | Fueling Sites Available to the Public Statewide |
|---|---|
| Compressed Natural Gas | 98 |
| Electric | see foot note[2] |
| Ethanol | 2 |
| Liquefied Natural Gas | 5 |
| Methanol | 0 |
| Propane (LPG) | 918 |

This information was compiled from data provided by the U.S. Department of Energy, the Texas General Land Office, the Texas Railroad Commission, and the Texas State Technical College in Waco.

## 4.3. Transit Authority Fleets

Senate Bill 200 required the TNRCC to adopt regulations which require transit authorities in the four Texas ozone non-attainment areas and chartered under Chapters 451, 452, and 453 of the Texas Transportation Code to ensure that as of September 1, 1996, 50 percent of their fleet consists of vehicles certified to meet the LEV standards. Similar requirements defined in the Texas Transportation Code cover the remaining Chapter 451, 452, and 453 transit authorities located outside of the non-attainment areas.

Affected transit authority fleets can grandfather up to 30 percent of the vehicles in their fleets that are not certified to the LEV standards for compliance with the percent of fleet requirements if these vehicles were acquired by the fleet before September 1, 1996 and certain eligibility conditions are met.

A light-duty vehicle is capable of being grandfathered into the program and used for compliance purposes if the vehicle has a gross vehicle weight rating (GVWR) of 8,500 lbs. or less, has been certified to meet the Tier I emission standards for light-duty vehicles, and is capable of being operated on electricity, ethanol or ethanol/gasoline blends of 85 percent or more ethanol, liquefied petroleum gas (propane), methanol or methanol/gasoline blend of 85 percent or more methanol, or natural gas.

A heavy-duty vehicle can be grandfathered into the program and used for compliance purposes if the vehicle has a GVWR of greater than 8,500 lbs., meets the emission standards to which it was originally certified, and is capable of being operated on electricity, ethanol, or ethanol/gasoline blends of 85 percent or more ethanol, liquefied petroleum gas (propane), methanol or methanol/gasoline blend of 85 percent or more methanol, or natural gas.

A vehicle is capable of operating on a specified fuel when the vehicle has the necessary permanently installed equipment that enables the vehicle to use the fuel as a power source. Grandfathered vehicles are not eligible to generate mobile emission reduction credits (MERCs) or program compliance credits (PCCs).

[2]Electric vehicles can be recharged at virtually any electrical outlet (most electric vehicles have the capability of charging at either 110 or 220 volt outlets).

In 1995, the TNRCC surveyed transit authorities statewide in accordance with the reporting requirements in the Health and Safety Code and the Texas Transportation Code. Of the transit authorities surveyed, eight were defined as being chartered under Chapters 451, 452, and 453 of the TTC and therefore required to meet the percent of fleet requirements using vehicles certified to meet the LEV standards. The results from the survey are presented in Table 4.

**Table 4. Fleet Data Survey For Texas Transit Authorities, December 1995**

| Transit Authorities | Charter Type[1] | NAA | Total Vehicles | Grandfathered Vehicles[2] | LEV-Certified Vehicles | Grandfathered and LEV vehicles as a percent of total fleet |
|---|---|---|---|---|---|---|
| Metropolitan Transit Authority of Harris County, TX* | 451 | Y | 1,736 | 330 | 28[3] | 20.62% |
| Dallas Area Rapid Transit* | 452 | Y | 1,319 | 125 | 131[4] | 19.41% |
| Fort Worth Transit Authority* | 452 | Y | 203 | 61 | 0 | 30.04% |
| Sun Metro, City of El Paso* | 453 | Y | 239 | 72 | 0 | 30.13% |
| Capital Metro Transportation Authority - Austin | 451 | N | 454 | 136[5] | 0 | 29.95% |
| Corpus Christi Regional Transportation Authority | 451 | N | 135 | 41[5] | 0 | 30.37% |
| VIA Metropolitan Transit - San Antonio | 451 | N | 757 | 151[5] | 0 | 19.95% |
| Laredo Municipal Transit System, El Metro | 453 | N | 63 | 19[5] | 0 | 30.15% |

***** Data updated September 1996

THESE NUMBERS INCLUDE BUS, SHUTTLE, AND SUPPORT/MAINTENANCE VEHICLES

As shown in Table 4, none of the affected transit authority fleets have been able to purchase sufficient vehicles certified to meet the LEV standards or generate enough credits to meet the 50 percent LEV requirement in 1996.

Below is a discussion of the status of each affected transit authority fleet based upon the information reported to the TNRCC.

[1] 451 = TTC Chapter 451, Metropolitan Rapid Transit Authority (MTA)
452 =TTC Chapter 452, Regional Transportation Authority (RTA)
453 =TTC Chapter 453, City Transportation Department (CTD)

[2] Fleet may have more alternatively fueled vehicles than listed, however, statute limits grandfathering to 30% of total fleet.

[3] Program Compliance Credit from the use of 14 certified ILEVs.

[4] Mobile Emission Reduction Credit from the replacement of 31 diesel buses by electric light-rail cars.

[5] Assumption based on eligibility of vehicles

*1. Transit Authorities in Non-Attainment Areas Subject to the TNRCC's Rules*

**a. Dallas Area Rapid Transit (DART)**

DART has acquired Mobile Emission Reduction Credits equaling 131 vehicles certified to meet the LEV standards for the replacement of 31 conventional diesel-powered transit buses through the use of their electric light-rail system which became operational in 1996. In addition, DART has grandfathered 125 vehicles toward compliance with their LEV requirement.

The sum of DART's credits and grandfathered vehicles is equivalent to 256 vehicles certified to meet the LEV standards and 19.41 percent of their total affected fleet. Based on these calculations, DART is 30.59 percent below the amount needed to meet the September 1, 1996 requirement of having 50 percent of their total fleet as vehicles certified to meet the LEV standards.

**b. El Paso, Sun Metro**

Sun Metro is eligible to grandfather 72 vehicles toward compliance with their LEV requirement. These 72 grandfathered vehicles would constitute 30.13 percent of their total affected fleet. Based on these calculations, Sun Metro is 19.87 percent below the amount needed to meet the September 1, 1996 requirement of having 50 percent of their total fleet as vehicles certified to the LEV standards.

**c. Fort Worth Transit Authority, (The T)**

The T has grandfathered 61 vehicles toward compliance with their LEV requirement. These 61 grandfathered vehicles constitute 30.04 percent of their total affected fleet. Based on these calculations, the T is 19.96 percent below the amount needed to meet the September 1, 1996 requirement of having 50 percent of their total fleet as vehicles certified to the LEV standards.

**d. Metropolitan Transit Authority of Harris County (Houston Metro)**

Currently, Houston Metro, having purchased 14 ILEV-certified Ford Crown Victoria sedans, is the only transit authority fleet to have purchased any vehicles certified to meet the LEV standards. The purchase of the 14 ILEV-certified vehicles generated Program Compliance Credits equaling 28 additional vehicles certified to meet the LEV standards. In addition, Houston Metro has grandfathered 330 vehicles toward compliance with their LEV requirement.

The sum of Houston Metro's credits and grandfathered vehicles is equivalent to 358 vehicles certified to the LEV standards and 20.62 percent of their total affected fleet. Based on these calculations, Houston Metro is 29.38 percent below the amount needed to meet the September 1, 1996 requirement of having 50 percent of their total fleet as vehicles certified to meet the LEV standards.

**e. Beaumont Municipal Transit System and Port Arthur Transit**

Beaumont and Port Arthur transit authorities have indicated to the executive director of the TNRCC that they are not chartered under 451, 452, or 453 of the Texas Transportation Code (TTC) and are therefore not covered under the TNRCC's rules for transit authorities. These transit authorities will be treated as local governments and will therefore be subject to phase II of the TNRCC's rule-making.

*2. Transit Authorities Not Impacted by the TNRCC's Rules*

The Texas Transportation Code provides the governing boards of transit authority fleets that operate outside the state's non-attainment areas the authority to grant exceptions for their own fleets. These governing boards may grant themselves exceptions from the clean-fuel vehicle requirements if they demonstrate that their vehicles will be operating primarily in an area in which neither the authority nor a supplier has, or can reasonably be expected to establish, a central refueling station necessary for the operation of clean-fuel vehicles; or they are unable to acquire, or be provided, equipment or refueling facilities necessary to operate clean-fuel vehicles at a projected cost that is reasonably expected to result in no greater net costs than the continued use of equipment or refueling facilities used to operate conventional vehicles, measured over the expected useful life of the equipment or facilities supplied.

**a. Corpus Christi Regional Transit**

In response to the TNRCC's December 1995 survey, Corpus Christi Regional Transit reported an inventory of 46 vehicles capable of operating on one of the five specified fuels (electricity, ethanol, liquefied petroleum gas, methanol, or natural gas) but not certified to the LEV standards. Corpus Christi Regional Transit may be eligible to grandfather 41 of these vehicles toward compliance with their LEV requirement (depending upon their emissions levels). If eligible, these 41 grandfathered vehicles would constitute 30.37 percent of their total affected fleet. Based on these calculations, Corpus Christi Regional Transit is 19.63 percent below the amount needed to meet the September 1, 1996 50 percent LEV requirement.

**b. Laredo Municipal Transit System, (El Metro)**

In response to the TNRCC's December 1995 survey, El Metro reported an inventory of 28 vehicles capable of operating on one of the five specified fuels (electricity, ethanol, liquefied petroleum gas, methanol, or natural gas) but not certified to the LEV standards. El Metro may be eligible to grandfather 19 of these vehicles toward compliance with their LEV requirement (depending upon their emissions levels). If eligible, these 19 grandfathered vehicles would constitute 30.15 percent of their total affected fleet. Based on these calculations, El Metro is 19.85 percent below the amount needed to meet the September 1, 1996 50 percent LEV requirement.

**c. Via Metropolitan Transit - San Antonio**

In response to the TNRCC's December 1995 survey, Via Metropolitan Transit reported having 151 vehicles capable of operating on one of the five specified fuels (electricity, ethanol, liquefied petroleum gas, methanol, or natural gas) but not certified to the LEV standards. Via Metropolitan Transit may be eligible to grandfather all of these vehicles toward compliance with their LEV requirement. If eligible, these 151 grandfathered vehicles would constitute 19.95 percent of their total affected fleet. Based on these calculations, Via Metropolitan Transit is 30.16 percent below the amount needed to meet the September 1, 1996 requirement of having 50 percent of their total fleet as vehicles certified to meet the LEV standards.

*3. Certain Transit Authorities - Capital Metropolitan Transportation Authority, Austin (Capital Metro)*

The Executive Director of the TNRCC is authorized to reduce or waive the 50 percent LEV requirement specified by the Texas Transportation Code, Section 451.301, for up to two years, for metropolitan rapid transit authorities created under Chapter 451 that were confirmed at a tax election before July 1, 1985, and

whose principal city has a population of less than 750,000. The only transit authority affected by this provision is Capital Metro in Austin, Texas. The Executive Director is authorized to grant such waivers if the authority demonstrates that its vehicles will be operating primarily in an area in which neither the authority nor a supplier has, or can reasonably be expected to establish, a central refueling station necessary for the operation of clean-fuel vehicles; or the authority is unable to acquire, or be provided, equipment or refueling facilities necessary to operate clean-fuel vehicles at a projected cost that is reasonably expected to result in no greater net costs than the continued use of equipment or refueling facilities used to operate conventional vehicles, measured over the expected useful life of the equipment or facilities supplied.

A proposal must be submitted by Capital Metro to the Executive Director certifying that the transit authority is unable to comply with the program. The proposal must contain an alternative implementation schedule for meeting the percentage requirements of the Texas Transportation Code, Section 451.301 and must have been the subject of a public meeting held to discuss the authority's inability to comply with its requirements, and the proposed alternative implementation schedule.

In response to the TNRCC's December 1995 survey, Capital Metro reported having 162 vehicles capable of operating on one of the five specified fuels (electricity, ethanol, liquefied petroleum gas, methanol, or natural gas) but not certified to the LEV standards. Capital Metro may be eligible to grandfather 136 of these vehicles toward compliance with their LEV requirement. If eligible, these 136 grandfathered vehicles would constitute 29.95 percent of the total affected fleet, 20.05 percent below the amount needed to meet the September 1, 1996 requirement of having 50 percent of their total fleet as vehicles certified to meet the LEV standards.

The TNRCC is currently reviewing Capital Metro's application. This exception is based on different criteria to the exceptions from the other affected transit authorities under the TNRCC's rules (Houston Metro, DART, The T, and Sun Metro).

## 4.4. Private Fleet Coverage

Texas currently has approximately 5,500,000 vehicles within the state's four non-attainment areas. The TNRCC estimates that there are about 1,225 private fleets with more than 25 vehicles in the state's four non-attainment areas and about 200 local governments with fleets of more than 15 vehicles. These fleets are expected to have approximately 245,000 vehicles within their fleets by September 1998. Thus, private and local government fleet vehicles make up approximately 4 percent of the state's total vehicle population. The total number of LEVs projected to be in the fleets by 1998, the start of the program, is 2,020.

By 2007, assuming a fleet growth rate of 2.2 percent per year, it is estimated that the total vehicle population within the state's four non-attainment areas will be 7,400,000 vehicles, with 152,000 LEVs projected to be in operation in private and local government fleets, approximately 2 percent of the state's total vehicle population.

# 5. STATE AND TRANSIT AUTHORITY FLEET DETERMINATIONS

## 5.1. Evaluation/Determination Regarding Transit Authority and State Fleets

The TNRCC is required by SB 200 to make three determinations on the effectiveness of the alternative fuels/LEV program for transit authority and state fleets by December 31, 1996. The determinations relate to whether or not the state should increase the required percentages (from 50 percent in 1996 to 90 percent in 1998) of fleet vehicles that must be certified to the low emission vehicle (LEV) standard for transit authorities, or capable of operating on one of the five specified fuels (electricity, ethanol, liquefied petroleum gas, methanol, or natural gas) for state fleets. The separate determinations are based on different criteria provided in SB 200 for the three affected state codes. These criteria are outlined below in Table 5.

**Table 5. Determination Criteria**

| Affected Code | Who It Applies To | Determination Criteria |
|---|---|---|
| Health and Safety Code (HSC) | Transit authorities **in non-attainment areas** that were established under Chapters 451, 452, or 453 of the TTC | 1) Is the program reducing emissions;<br>2) Is the program projected to be effective in improving overall air quality; and<br>3) Is the program necessary to the attainment of the federal ambient air quality standards in the affected area. |
| Texas Transportation Code (TTC) | Transit authorities **in all areas** established under Chapters 451, 452, or 453 of the TTC | Has the program been effective in reducing total annual emissions from motor vehicles in the area. |
| State Purchasing Code (SPC) | All state agencies with fleets numbering more than 15 vehicles | Has the program been effective in reducing total annual emissions from motor vehicles in the area. |

*1. Transit Authority Fleets*

For transit authority fleets, an increase in the percentage requirements would result in fleets being required to have 90 percent of their affected vehicles as meeting the low emission vehicle (LEV) standard by September 1, 1998. Staff evaluation of the effectiveness of the LEV program for transit authority fleets (based on the criteria outlined for each affected state code), along with the Commissioners' determinations, are provided below.

**a. Non-attainment Area Transit Authority Fleets under the Health and Safety Code**

Criterion Number 1: Is the program reducing emissions?

Evaluation: Emission reductions from the current LEV program for transit authorities in the non-attainment areas are estimated to be 0.0072 tons/day (14.4 lbs/day) VOC and 0.0341 tons/day (68.2 lbs/day) NOx . This reduction estimate is based on the use of 14 certified natural gas LEVs by Houston Metro, and the emission reduction credits gained from the removal of 31 diesel buses due to the

introduction of DART's electric light-rail system.

Criterion Number 2: Is the program projected to be effective in improving overall air quality?

Evaluation: Under the best case assumption that transit authorities in the non-attainment areas are able to replace 90 percent of their current conventional vehicles with LEV-certified vehicles between September 1, 1996 and September 1, 1998, emission reductions from transit authority fleets in the non-attainment areas are projected to be 0.4256 tons/day (851 lbs/day) for VOCs and 0.4150 tons/day (830 lbs/day) for NOx (from an estimated 3428 vehicles). Realistically, however, the emission reductions from the program are likely to be considerably less due to several factors:

- There are currently no certified LEV vehicles in heavy-duty configurations needed for transit authority operations.
- Grandfathering of specified fuel use vehicles (up to 30 percent maximum) results in less emission reductions.
- Exceptions from the program allow fleets to be waived from the LEV percentage requirements based on economics. (The current cost of LEV-certified vehicles and engines exceeds the cost of conventionally certified vehicles and engines and is expected to remain that way for the near future.)

Criterion Number 3: Is the LEV program necessary to the attainment of the federal ambient air quality standards in the affected area?

Evaluation: Emission reductions from transit authorities located in the non-attainment areas have not been included in the State Implementation Plan (SIP). However, inclusion of emission reductions from these fleets may be necessary in future rate-of-progress SIP revisions.

**Commissioners' Determination**: The percentage requirement for transit authorities in the non-attainment areas will remain at 50 percent LEV use. Staff was directed to continue monitoring emission reductions from the program.

**b. Statewide Transit Authority Fleets under the Texas Transportation Code**

Criterion: Has the program been effective in reducing total annual emissions from motor vehicles in the area?

Evaluation: Only Houston Metro (14 LEVs) and DART (electric light-rail) are currently realizing emission reductions under the LEV program. As such, estimated emission reductions from all affected transit authority fleets are the same as those addressed in Section 5.1.1.a. above for transit authority fleets in the non-attainment areas (i.e., 0.0072 tons/day (14.4 lbs/day) for VOCs and 0.0341 tons/day (68.2 lbs/day) for NOx).

**Commissioners' Determination**: The percentage requirement for all transit authorities affected by the TTC will remain at 50 percent LEV use. Staff was directed to continue monitoring the emission reductions from the program.

*2. State Fleets*

For state fleets, an increase in the percentage requirements would result in affected fleets being required to have 90 percent of their vehicles "capable of using" a specified fuel by September 1, 1998. The specified fuels are: electricity, ethanol, liquefied petroleum gas, methanol, or natural gas. Staff evaluation of the effectiveness of the alternative fuels program for state fleets (based on the criteria outlined for the affected state code), along with the Commissioners' determination, is provided below.

**a. State Fleets Under the State Purchasing Code**

Criterion: Has the program been effective in reducing total annual emissions from motor vehicles in the area?

Evaluation: State vehicle fleets are not required to meet the LEV standards, and are not required to use the specified fuel, only be "capable of using" it. Data indicate that about 30 percent of the state fleet is "capable of using" one of the specified fuels. However, only approximately 15 percent of the fuel purchased for use in all state vehicles is one of the specified fuels. Of this 15 percent, approximately 80 percent is propane and 20 percent is compressed natural gas. Of the 30 percent capable of using one of the specified fuels, almost 100 percent are dual-fuel conversions.

Current research[6,7,8] into fuel use and associated emissions demonstrates the inconsistency of emission reductions from dual-fuel vehicle conversions. In the studies, emission reductions for VOCs ranged from a best case of 0.295 grams/mile (g/mi) **decrease** to a worst case of 0.391 g/mi **increase** when compared to the vehicle's gasoline baseline. NOx emissions ranged from a best case of 0.453 g/mi decrease to a worst case of 0.575 g/mi increase, when compared to the vehicle's gasoline baseline. Under the best case scenario[9], the average emissions reduction from "successful"[10] conversions is 0.0067 g/mi VOC, with no NOx benefit. If the average best case emission reduction numbers in grams per mile are applied to the 15 percent alternative fuel use by state fleets, emission reductions would be 0.0008 tons/day (1.6 lbs/day) VOC. However, under the average worst case there may be no emissions benefit.

**Commissioners' Determination**: The percentage requirement will remain at 50 percent capable of using one of the five specified fuels. Staff was directed to continue monitoring reductions from the program.

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[6]*The Texas Project*, 1995. Data collected on mainly 1994 model year vehicles with 1994 conversion kits.

[7]*Alternatively Fueled Vehicle Emissions Study*, 1995, a contract study completed for the TNRCC.

[8]*Compressed Natural Gas and Liquefied Petroleum Gas Conversions: The National Renewable Energy Laboratory's Experience*, 1996

[9]These gram/mile reduction numbers were taken as an average from the *Alternatively Fueled Vehicle Emissions Study*, and *The Texas Project*. The 15 percent alternative fuel use by state fleets was obtained from the General Services Commission.

[10]The success of a conversion kit was determined, according to *The Texas Project*, as the emissions levels being at or below the emissions of the vehicle operating on gasoline, providing the kit was installed following procedures recommended by the manufacturer. In some cases conversions were optimized for emissions.

# APPENDIX I - History

**1989:**
Senate Bill (SB) 740, Acts of the 71st Texas Legislature, 1989, modified Vernon's Texas Civil Statutes to require transit authorities chartered under Articles 1118x, 1118y, or 1118z of Vernon's Texas Civil Statutes to purchase only vehicles capable of operating on alternative fuels. In addition, it required these transit authority fleets to have certain percentages of alternatively fueled vehicles in their fleets as follows:

- 30 percent by 9-1-94,
- 50 percent by 9-1-96, and
- 90 percent by 9-1-98, pending a determination by the Texas Air Control Board (TACB)

Alternative fuels were initially defined as electricity, liquefied petroleum gas, and natural gas. The Texas Air Control Board (TACB) approved methanol as an alternative fuel in March of 1992, and ethanol as an alternative fuel in February of 1993. SB 740 also modified the State Purchasing Code (SPC) requiring state agency and school district fleets to use alternative fuels following the same implementation schedule as transit authority fleets. State agency and school district alternative fuel use was also subject to a determination for the 90 percent alternative fuel use requirement.

SB 769, Acts of the 71st Texas Legislature, 1989 modified the Texas Clean Air Act to require the Texas Air Control Board to implement rules requiring transit authorities chartered under Articles 1118x, 1118y, or 1118z of Vernon's Texas Civil Statutes, and located within a non-attainment area, to have certain percentages of alternatively fueled vehicles in their fleets as follows:

- 30 percent by 9-1-94,
- 50 percent by 9-1-96, and
- 90 percent by 9-1-98, pending a determination by the TACB.

SB 769 also required the TACB to make a determination by 9-1-96 whether or not to include local governments and private fleets in the alternative fuel mandates starting in 1998.

**1990:**
The 1990 Federal Clean Air Act Amendments (CAAA) required states with serious and above ozone and carbon monoxide (CO) non-attainment areas to implement a low emission vehicle (LEV) program for centrally fueled fleets, called the Federal Clean Fuel Fleet (FCFF) program. The CAAA also included an opt-out provision which allowed states to implement a different program, if the program was projected to achieve equivalent emission reductions to the FCFF program.

**1991:**
House Bill (HB) 734, Acts of the 72nd Texas Legislature, 1991 required the TACB to implement rules under Article 1118x of Vernon's Texas Civil Statutes requiring certain transit authorities (identified as applying to Capital Metro in Austin) to apply for exceptions from the 1118x of Vernon's Texas Civil Statute's alternative fuel requirements through the TACB.

Senate Bill 2, Acts of the 72nd Texas Legislature, First Called Session, 1991 created the Texas Natural Resource Conservation Commission from the Texas Water Commission, parts of the Texas Department of Health, and the Texas Air Control Board.

**1992:**
In 1992, the Texas Air Control Board (TACB) opted out of the FCFF through a committal State Implementation Plan (SIP). The TACB made its decision to opt-out because Texas already had an alternative fuels program covering certain fleets (SB 740 and 769). The TACB did not feel it was appropriate to develop different fleet programs covering the same fleets and intended to use as much legislative direction as possible in the opt-out program.

**1993:**
Senate Bill 7, Acts of the 73rd Texas Legislature, 1993 modified the State Purchasing Code (SPC) (recodified in the Education Code) by removing the 30 percent alternative fuel use requirement from school districts and delaying the 50 percent alternative fuel use requirement until September 1, 1997. In addition, SB 7 removed the determination required of the TACB for school districts and required these fleets to have 90 percent alternative fuel use by September 1, 2001.

On September 1, 1993 the TNRCC was formed as a result of SB 2, Acts of the 72nd Texas Legislature, First Called Session.

**1994:**
In 1994, the TNRCC formally adopted the Texas Alternative Fuel Fleet (TAFF) program rule and SIP opt-out. This program required specified alternative fuel use for those entities required at that time to use alternative fuels by the legislature: transit authorities, school districts, and state agencies. It also required these entities to meet the federal LEV requirements beginning in September 1998 using an approved alternative fuel in order to achieve equivalency with the FCFF program. In addition, the TAFF required local government and private fleets to meet the LEV standards, but on their fuel of choice.

Exceptions were allowed under Articles 1118x, 1118y, and 1118z of Vernon's Texas Civil Statutes, the SPC, and the HSC. Transit authorities were allowed to self-certify the need for an exception under the 1118x, 1118y, or 1118z requirements but were required to have the TNRCC grant an exception from the identical requirements under the HSC. State agency fleets and school district fleets were originally allowed to apply for exceptions from the General Services Commission (GSC). SB 7 changed the exception requirements for school districts to allow the individual school boards to self-certify the need for an exception.

**1995:**
SB 200, Acts of the 74th Texas Legislature, 1995 modified the Articles 1118x, 1118y, and 1118z of Vernon's Texas Civil Statutes (re-codified in the Texas Transportation Code by SB 971, Acts of the 74th Texas Legislature, 1995 as Chapters 451, 452, and 453), the HSC, and the SPC. SB 200 redefined the meaning of alternative fuel from meaning one of five original specified fuels (electricity, ethanol, liquefied petroleum gas, methanol, or natural gas) to any vehicle/fuel combination that is certified to the federal LEV standards regardless of fuel type. This modification required the TNRCC to implement the LEV standard provisions under the HSC in the state's four non-attainment areas. Therefore, all transit authorities (chartered under Chapters 451, 452, and 453 of the TTC), local governments, and private fleets located in the state's non-attainment areas now must purchase and maintain certain percentages of LEV- certified vehicles. SB 200 did not alter the fuel use requirements for state fleets nor did it impose any emission standard for state fleets. SB 1, Acts of the 74th Texas Legislature, 1995 removed all alternative fuel use requirements from school district fleets.

SB 200 also modified the TTC requiring all transit authorities chartered under Chapters 451, 452, or 453

of the TTC statewide, regardless of an area's attainment status, to meet the LEV standards (transit authority fleets covered by the LEV use requirements in attainment areas include: Laredo, Corpus Christi, Austin, and San Antonio). Requirements in the HSC and TTC are identical except that the TTC allows transit authorities to self-certify the need for an exception.

# APPENDIX II - State Fleet Data

The General Services Commission (GSC) is authorized to grant waivers from the specified fuel use percentages to state vehicle fleets on the basis of excessive cost or the lack of fuel or equipment. The manner in which GSC grants waivers effects how each state fleet determines compliance with the 50 percent capable of specified fuel use percentages. The GSC subtracts the number of waived vehicles from a fleet's total vehicle population and then recalculates the percentage of specified fuel use vehicles based on this new total.

For example: The first state fleet listed in the following tables is Abilene State School. Abilene State School reported to GSC that they have 222 total vehicles, of which 82 (37 percent) are capable of operating on one of the five specified fuels. However, Abilene State School has received 16 waivers from the GSC. GSC subtracts these 16 waived vehicles from Abilene State School's total fleet of 222 vehicles, reducing the affected vehicle fleet to 206 vehicles. The percentage of vehicles capable of operating on one of the five specified fuels is then based on this reduced total fleet number, resulting in a compliance percentage of 40 percent.

## Status of State Agencies

*Table complied using data supplied by GSC (8-16-96)*

| Agency Number | Agency Name | Number of Vehicles | Number of Alternatively Fueled Vehicles | Percent of Alternatively Fueled Vehicles | GSC Vehicle Waivers | Percent of Fleet Meeting Requirement |
|---|---|---|---|---|---|---|
| 676 | Abilene State School | 222 | 82 | 37 | 16 | 40 |
| 401 | Adjutant General's Office | 28 | 1 | 4 | 0 | 4 |
| 657 | Amarillo State Center | 178 | 28 | 16 | 0 | 16 |
| 737 | Angelo State University | 82 | 25 | 30 | 0 | 30 |
| 677 | Austin State Hospital | 130 | 57 | 44 | 1 | 44 |
| 678 | Austin State School | 131 | 53 | 40 | 6 | 42 |
| 302 | Attorney General | 46 | 31 | 67 | 1 | 69 |
| 658 | Beaumont State Center | 52 | 11 | 21 | 0 | 21 |
| 686 | Big Spring State Hospital | 77 | 20 | 26 | 15 | 34 |
| 688 | Brenham State School | 89 | 18 | 20 | 59 | 60 |
| 670 | Corpus Christi State School | 79 | 7 | 9 | 0 | 9 |
| 760 | Corpus Christi State University | 40 | 7 | 18 | 0 | 18 |
| 660 | Denton State School | 253 | 66 | 26 | 0 | 26 |
| 751 | East Texas State University | 72 | 30 | 42 | 5 | 45 |
| 661 | El Paso State Center | 41 | 7 | 17 | 37 | 100 |
| 667 | Fort Worth State School | 121 | 15 | 12 | 0 | 12 |

| Agency Number | Agency Name | Number of Vehicles | Number of Alternatively Fueled Vehicles | Percent of Alternatively Fueled Vehicles | GSC Vehicle Waivers | Percent of Fleet Meeting Requirement |
|---|---|---|---|---|---|---|
| 305 | General Land Office | 37 | 29 | 78 | 3 | 85 |
| 303 | General Services Commission | 140 | 21 | 15 | 108 | 66 |
| 674 | Kerrville State Hospital | 114 | 43 | 38 | 0 | 38 |
| 734 | Lamar University - Beaumont | 87 | 10 | 11 | 0 | 11 |
| 699 | Laredo State Center | 69 | 21 | 30 | 6 | 33 |
| 687 | Lubbock State School | 108 | 31 | 29 | 56 | 60 |
| 669 | Lufkin State School | 54 | 18 | 33 | 16 | 47 |
| 655 | Mental Health and Mental Retardation | 34 | 12 | 35 | 0 | 35 |
| 672 | Mexia State School | 261 | 50 | 19 | 3 | 19 |
| 735 | Midwestern State University | 64 | 20 | 31 | 0 | 31 |
| 802 | Parks and Wildlife Department | 2,118 | 300 | 14 | 0 | 14 |
| 715 | Prairie View A & M University | 61 | 13 | 21 | 0 | 22 |
| 455 | Railroad Commission | 250 | 107 | 43 | 1 | 43 |
| 668 | Richmond State School | 253 | 113 | 45 | 0 | 45 |
| 659 | Rio Grande State Center | 74 | 29 | 39 | 7 | 43 |
| 679 | Rusk State Hospital | 73 | 24 | 33 | 1 | 33 |
| 753 | Sam Houston State University | 112 | 32 | 29 | 0 | 28 |
| 671 | San Angelo State School | 92 | 39 | 42 | 1 | 43 |

| Agency Number | Agency Name | Number of Vehicles | Number of Alternatively Fueled Vehicles | Percent of Alternatively Fueled Vehicles | GSC Vehicle Waivers | Percent of Fleet Meeting Requirement |
|---|---|---|---|---|---|---|
| 681 | San Antonio State Hospital | 160 | 17 | 11 | 103 | 30 |
| 650 | San Antonio State School | 109 | 37 | 34 | 33 | 49 |
| 754 | Southwest Texas State University | 225 | 29 | 13 | 0 | 13 |
| 755 | Stephen F. Austin University | 242 | 14 | 6 | 167 | 19 |
| 756 | Sul Ross State University | 66 | 9 | 14 | 44 | 41 |
| 713 | Tarleton State University | 74 | 7 | 9 | 66 | 88 |
| 682 | Terrell State Hospital | 87 | 21 | 24 | 0 | 24 |
| 711 | Texas A & M University | 753 | 89 | 12 | 491 | 34 |
| 718 | Texas A & M University - Galveston | 24 | 6 | 25 | 3 | 28 |
| 732 | Texas A & M University - Kingsville | 122 | 6 | 5 | 115 | 86 |
| 555 | Texas Agricultural Extension Service | 222 | 42 | 19 | 34 | 22 |
| 556 | Texas Agriculture Experiment Station | 593 | 73 | 12 | 507 | 85 |
| 577 | Texas Animal Damage Control Service | 78 | 13 | 17 | 35 | 30 |
| 318 | Texas Commission for the Blind | 32 | 11 | 34 | 1 | 35 |
| 551 | Texas Department of Agriculture | 227 | 75 | 33 | 0 | 33 |
| 696 | Texas Department of Criminal Justice | 1,939 | 585 | 30 | 245 | 35 |
| 501 | Texas Department of Health | 128 | 54 | 42 | 0 | 42 |
| 405 | Texas Department of Public Safety | 244 | 128 | 52 | 7 | 52 |

| Agency Number | Agency Name | Number of Vehicles | Number of Alternatively Fueled Vehicles | Percent of Alternatively Fueled Vehicles | GSC Vehicle Waivers | Percent of Fleet Meeting Requirement |
|---|---|---|---|---|---|---|
| 601 | Texas Department of Transportation | 10,291 | 4,412 | 43 | 1250 | 49 |
| 322 | Texas Employment Commission | 33 | 12 | 36 | 15 | 67 |
| 712 | Texas Engineering Experiment Station | 29 | 7 | 24 | 0 | 24 |
| 716 | Texas Engineering Extension Service | 190 | 22 | 12 | 129 | 36 |
| 576 | Texas Forest Service | 590 | 12 | 2 | 10 | 2 |
| 582 | Texas Natural Resource Conservation Commission | 238 | 127 | 53 | 10 | 56 |
| 771 | Texas School for the Blind | 23 | 8 | 35 | 3 | 40 |
| 772 | Texas School for the Deaf | 33 | 6 | 18 | 8 | 24 |
| 717 | Texas Southern University | 36 | 0 | 0 | 0 | 0 |
| 719 | Texas State Technical College - Waco/Marshall | 148 | 1 | 1 | 0 | 1 |
| 733 | Texas Tech University | 335 | 129 | 38 | 202 | 97 |
| 739 | Texas Tech University/Health Science Center | 32 | 15 | 47 | 20 | 100 |
| 602 | Texas Turnpike Authority | 44 | 31 | 70 | 0 | 70 |
| 580 | Texas Water Development Board | 64 | 11 | 17 | 6 | 19 |
| 731 | Texas Woman’s University | 99 | 13 | 13 | 72 | 48 |
| 694 | Texas Youth Commission | 256 | 52 | 20 | 111 | 36 |
| 675 | Travis State School | 25 | 9 | 37 | 0 | 36 |
| 730 | University of Houston | 142 | 10 | 7 | 110 | 31 |

| Agency Number | Agency Name | Number of Vehicles | Number of Alternatively Fueled Vehicles | Percent of Alternatively Fueled Vehicles | GSC Vehicle Waivers | Percent of Fleet Meeting Requirement |
|---|---|---|---|---|---|---|
| 759 | University of Houston - Clear Lake | 43 | 0 | 0 | 0 | 0 |
| 752 | University of North Texas | 204 | 8 | 4 | 169 | 23 |
| 763 | University of North Texas Health Science Center | 25 | 8 | 32 | 0 | 32 |
| 785 | University of Texas (UT) Health Center - Tyler | 47 | 14 | 30 | 0 | 30 |
| 744 | UT Health Science Center - Houston | 91 | 25 | 27 | 0 | 27 |
| 745 | UT Health Science Center - San Antonio | 42 | 3 | 7 | 39 | 75 |
| 723 | UT Medical Branch - Galveston | 180 | 52 | 29 | 0 | 29 |
| 729 | UT Southwestern Medical Center - Dallas | 81 | 29 | 36 | 0 | 36 |
| 506 | UT-MD Anderson Cancer Center | 157 | 47 | 30 | 1 | 30 |
| 714 | UT - Arlington | 183 | 25 | 14 | 154 | 86 |
| 721 | UT - Austin | 699 | 74 | 12 | 655 | 100 |
| 747 | UT - Brownsville | 33 | 3 | 9 | 0 | 9 |
| 738 | UT - Dallas | 67 | 6 | 9 | 55 | 50 |
| 724 | UT - El Paso | 117 | 17 | 15 | 85 | 53 |
| 736 | UT - Pan American | 81 | 0 | 0 | 70 | 0 |
| 742 | UT - Permian Basin | 21 | 0 | 0 | 0 | 0 |
| 743 | UT - San Antonio | 81 | 9 | 11 | 25 | 16 |
| 750 | UT - Tyler | 20 | 2 | 10 | 0 | 10 |

| Agency Number | Agency Name | Number of Vehicles | Number of Alternatively Fueled Vehicles | Percent of Alternatively Fueled Vehicles | GSC Vehicle Waivers | Percent of Fleet Meeting Requirement |
|---|---|---|---|---|---|---|
| 756 | Vernon State Hospital | 60 | 21 | 35 | 0 | 35 |
| 680 | Waco Center for Youth | 42 | 13 | 31 | 0 | 31 |
| 757 | West Texas A & M University | 100 | 30 | 30 | 45 | 55 |
| 683 | Wichita Falls State Hospital | 124 | 46 | 37 | 0 | 37 |

| Total Number of State Agencies with more than 15 Vehicles | Total Number of Vehicles | Total Number of Alternatively Fueled Vehicles | Overall Percentage of Alternatively Fueled Vehicles | Total Number of GSC Vehicle Waivers | Overall Percentage of Fleet Meeting Requirement |
|---|---|---|---|---|---|
| **92** | **26,073** | **7,895** | **30%** | **5,437** | **38%** |